

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-4 (canceled).

Claim 5 (new): An isolated DC-DC converter comprising:

a transformer including an electromagnetically coupled primary coil, secondary coil, and tertiary coil;

a main switching device arranged on a side of the primary coil of the transformer to control energy supplied from an external power supply to the primary coil by a switching operation to control a voltage generated in the primary coil;

a secondary-side rectifying and smoothing circuit arranged to rectify and smooth an output voltage from the secondary coil corresponding to the voltage of the primary coil of the transformer and output a rectified and smoothed voltage to an external load;

a tertiary-side rectifying and smoothing circuit arranged to rectify and smooth an output voltage from the tertiary coil to produce a direct-current voltage, and detect and output the direct-current voltage as a detected voltage of the output voltage from the secondary-side rectifying and smoothing circuit; and

a control circuit arranged to control the switching operation of the main switching device on the basis of the detected voltage output from the tertiary-side rectifying and smoothing circuit so that the output voltage from the secondary-side rectifying and smoothing circuit is stabilized; wherein

the secondary-side rectifying and smoothing circuit includes a rectification-side synchronous rectifier and a commutation-side synchronous rectifier that perform a

switching operation in synchronization with the switching operation of the main switching device to rectify the output voltage from the secondary coil; and

the tertiary-side rectifying and smoothing circuit includes a commutation-side synchronous rectifier to rectify the output voltage from the tertiary coil, the commutation-side synchronous rectifier being arranged to be switched on when the main switching device is turned off.

Claim 6 (new): The isolated DC-DC converter according to claim 5, wherein the control circuit is arranged to output a turn-on signal to charge an input capacitance of the main switching device and turn-on the main switching device, the isolated DC-DC converter further comprising an early-turn-off circuit arranged to switch off the commutation-side synchronous rectifier of the secondary-side rectifying and smoothing circuit and the commutation-side synchronous rectifier of the tertiary-side rectifying and smoothing circuit before the main switching device is turned on during a time period between when the control circuit starts to output the turn-on signal and the time when the main switching device is turned on, the input capacitance being charged in the period.

Claim 7 (new): The isolated DC-DC converter according to claim 6, wherein the early-turn-off circuit of the commutation-side synchronous rectifier of the secondary-side rectifying and smoothing circuit includes a driving transformer, a first driving switch device, and a path of the first driving switch device; and the early-turn-off circuit of the commutation-side synchronous rectifier of the tertiary-side rectifying and smoothing circuit includes the driving transformer, a second driving switch device, and a path of the second driving switch device.

Claim 8 (new): The isolated DC-DC converter according to claim 5, wherein the tertiary-side rectifying and smoothing circuit includes a rectification-side synchronous rectifier arranged to be switched on during a period in which the main switching device is turned on in addition to the commutation-side synchronous rectifier.

Claim 9 (new): The isolated DC-DC converter according to claim 6, wherein the tertiary-side rectifying and smoothing circuit includes a rectification-side synchronous rectifier that is switched on during a period in which the main switching device is turned on in addition to the commutation-side synchronous rectifier.

Claim 10 (new): The isolated DC-DC converter according to claim 8, wherein a choke coil of the tertiary-side rectifying and smoothing circuit is provided between a positive electrode of the commutation-side synchronous rectifier and a smoothing capacitor of the tertiary-side rectifying and smoothing circuit.

Claim 11 (new): The isolated DC-DC converter according to claim 9, wherein a choke coil of the tertiary-side rectifying and smoothing circuit is provided between a positive electrode of the commutation-side synchronous rectifier and a smoothing capacitor of the tertiary-side rectifying and smoothing circuit.